



Alternative and Renewable Fuel and Vehicle Technology Program

Staff Workshop on Hydrogen Refueling
Infrastructure Alternative Funding Mechanisms

Art Rosenfeld Room
November 30, 2017



Agenda

Welcome	10:00 a.m.
Commitment to Diversity	10:10 a.m.
Choice Between Cap-X and O&M	10:20 a.m.
Regional	10:40 a.m.
Questions and Answers	11:00 a.m.
Lunch	12:00 p.m.



Agenda Continued

Loan Loss Reserve (LLR)	1:00 p.m.
Renewable Fuel Sales Reimbursement and Certificates of Guarantee	1:20 p.m.
Grant Amounts	2:30 p.m.
Wrap-up and Public Discussion	3:00 p.m.
Adjourn Workshop	3:30 p.m.



Welcome

- Facilities and Logistics
- In case of emergency
- Diversity Survey
 - <https://www.surveymonkey.com/r/97DZ73Q>



Commitment to Diversity

The Energy Commission adopted a resolution on April 8, 2015, to firmly commit to:

- Increase participation of women, minority, disabled veteran and LGBT business enterprises in program funding opportunities.
- Increase outreach and participation by disadvantaged communities.
- Increase diversity in participation at Energy Commission proceedings.
- Increase diversity in employment and promotional opportunities.



Commitment to Diversity

- **Fairness** – Increase funding accessibility to all Californians.
- **Inclusion** – Small businesses make up a significant portion of the U.S. economy.
- **Job Creation** – Projects can create jobs for residents of the under-served communities.
- **Diversity of Ideas** – Great ideas occur in a variety of areas.
- **Diversity in Communities' Needs** – Needs vary widely from one area to the next (air quality, socioeconomic, etc.).



Workshop Purpose

- To provide a forum to discuss alternative funding mechanisms for possible inclusion in future solicitation concepts.
- To discuss alternative funding mechanisms for hydrogen refueling infrastructure.
- To discuss potential directions.



Reminder

The discussions during this workshop are for possible future solicitation concepts and no applications are being accepted at this time.



Introduction

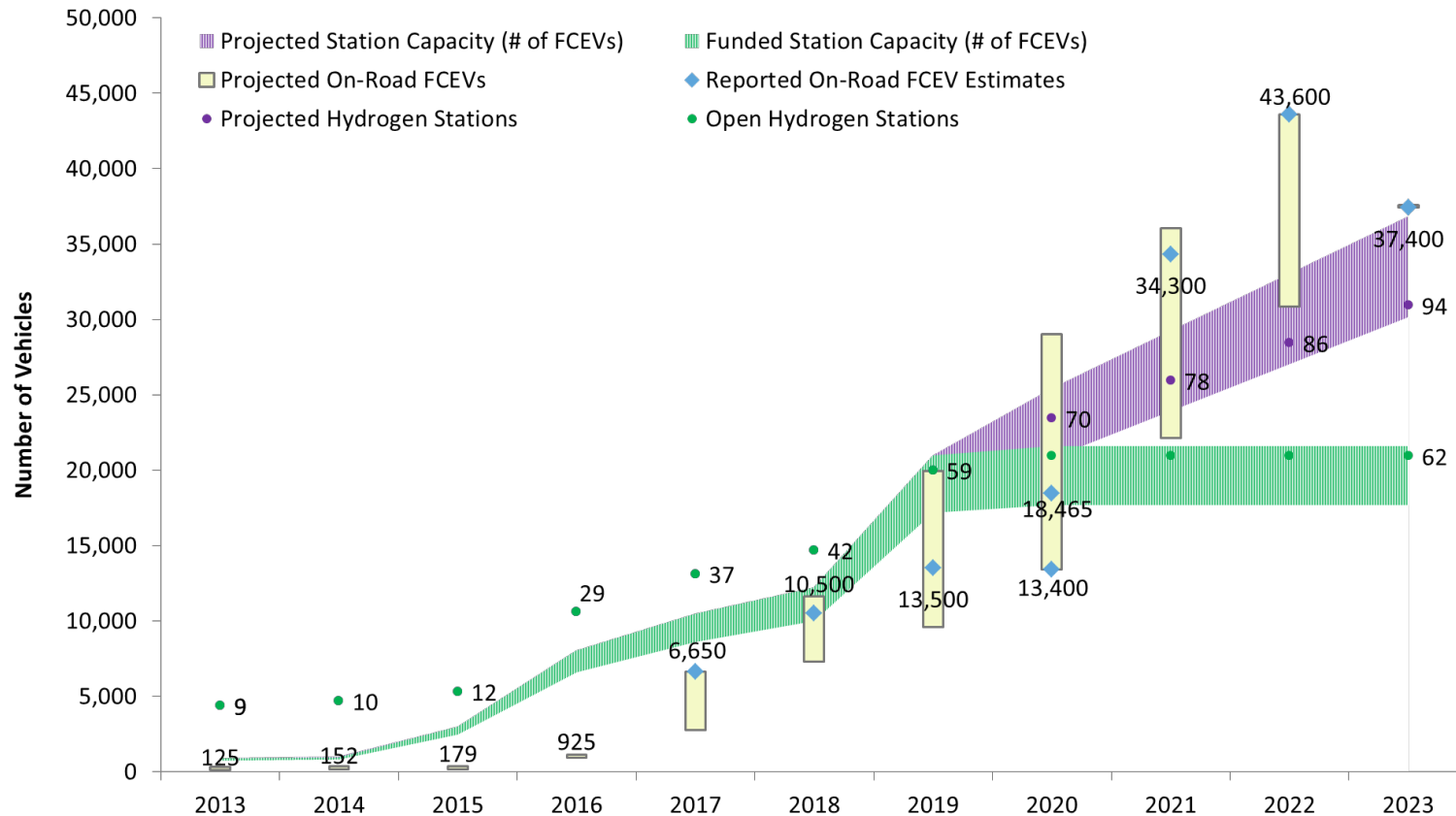
According to the CARB 2017 Annual Evaluation:

- Goal is to reduce per-station cost to the State.
- Rapid growth is a greater priority.
- Reduction in State cost-share for grants does not appear sufficient.
- Options to address reduction of financial risk.
- Need to address major challenges to more effectively leverage the \$20M annual allocation.



Capacity Shortfall

Source: 2017 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Development





Choice Between Cap-X and Operation and Maintenance

Miki Crowell



Examples: Choice Between Cap-X and O&M

- Applicant A *chooses*: \$2 million as Cap-X and funds the operation and maintenance of a station on their own.
- Applicant B *chooses*: \$2 million as O&M (requires a new definition of eligible expenses) and funds development and engineering (along with equipment as a possibility) on their own.
- Applicant C *chooses* to use \$1 million as Cap-X and \$1 million as O&M.



California Energy Commission

EXAMPLE Solicitations	Fiscal Years (FY)	Funding (\$ million)	Cap-X (\$ million)	# of Cap-X Stations	O&M (\$ million)	# of O&M Grants	# of Stations on NOPA
1 (in 2018)	18-19	\$20	\$20	10	\$0	0	20
	19-20	\$20	\$0	0	\$20	10	
2 (in 2021)	20-21	\$20	\$20	10	\$0	0	30
	21-22	\$20	\$20	10	\$0	0	
	22-23	\$20	\$0	0	\$20	10	
	23-24	\$10	\$0	0	\$0	0	
	Total	<u>\$10 Left Over</u>		30		20	50



Choice Between Cap-X and O&M

- Exact station addresses will become available for the stations to be funded later.
 - Helps FCEV deployment planning
- This funding mechanism could potentially fund as many as 50 stations, going forward.
 - \$10 million remaining at the end to potentially fund as many as five additional stations.



Choice Between Cap-X and O&M

- The applications would be evaluated using one set of evaluation criteria.
- The applications would be ranked on the same NOPA.
- The timeframe for the O&M agreements would be longer than 3 years to allow enough time to spend a larger O&M grant amount.



Regional

Jane Berner



Regional

- Two main differences to previous solicitations in this approach:
 - Funding per kilogram instead of per station,
 - Funding at a regional level instead of funding awarded one station at a time.



Regional

- Enables station right-sizing, at the right locations, by allowing applicants to propose the number of stations with a capacity that makes sense for their business model.
- One award per region provides more certainty about outcomes.
- Concentrate like equipment and station designs in a region, leading to standardization.



What This Idea Could Change

GFO-15-605

Funds awarded per station, with a maximum funding amount per station based on daily fueling capacity (180–299 or 300+ kg/day)

Grants awarded by station, with possibility of winning 0, 1, or X awards (up to the number of stations submitted by applicant or maximum funding award)

Future GFO if Idea Implemented

Funds awarded per region on a per kilogram basis, with a maximum funding per kilogram of daily fueling capacity

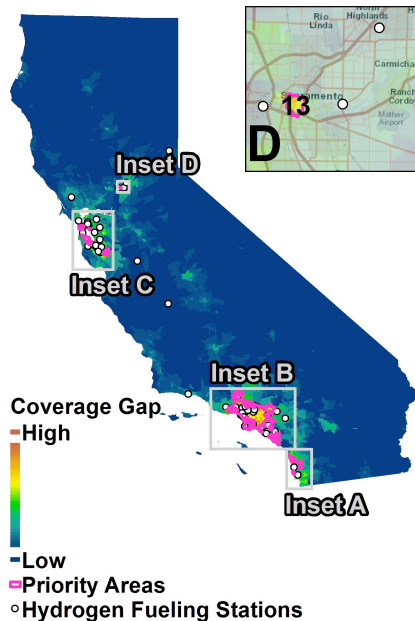
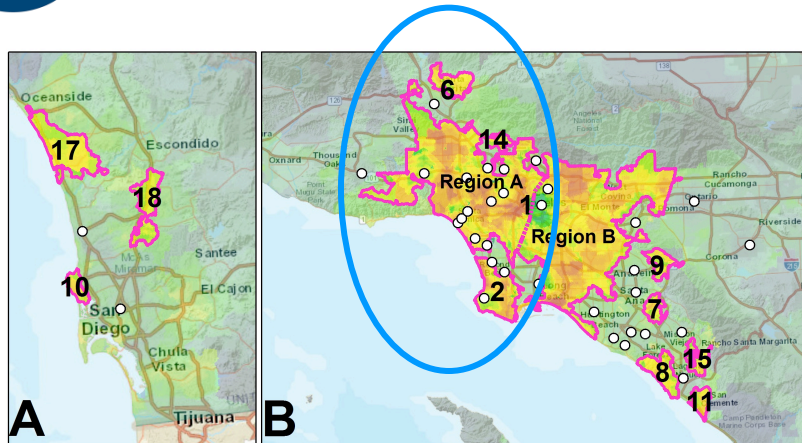
Grants awarded to one applicant in each region (win all or nothing), with a maximum funding award ensuring one applicant does not win all regions

Example

One competition:

- Regions 1(A), 2, 6 and 14
- Minimum daily capacity: 2,000 kg
- Applicants eligible for up to \$10 million in funding (Cap-X or O&M)

•Note: this is a fictional example for demonstration purposes only!

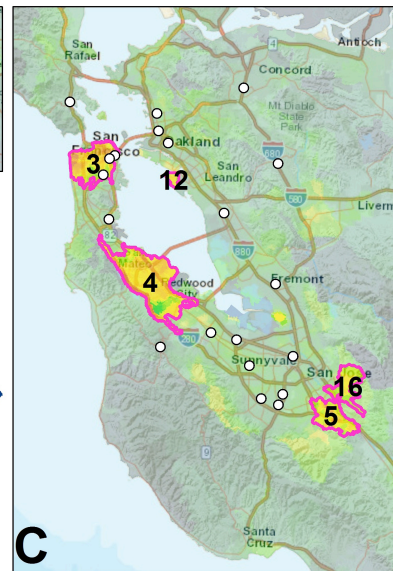
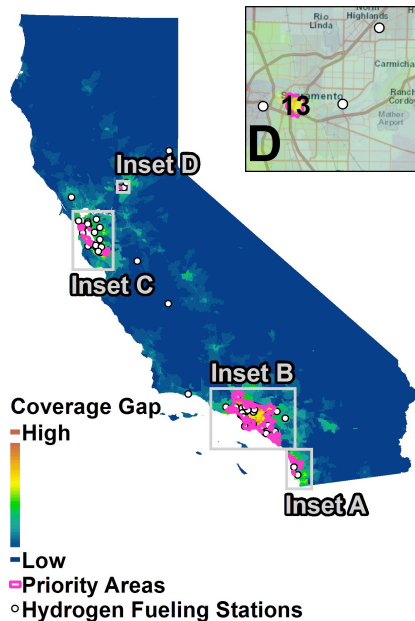
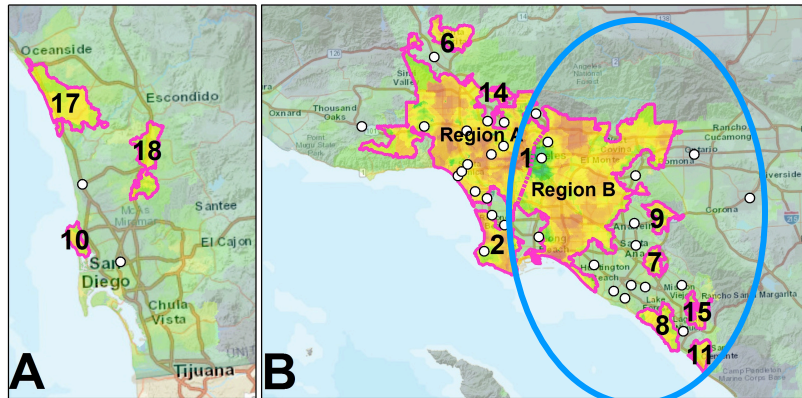


Source: CARB 2017
AB 8 Annual Evaluation

Example

Another competition:

- Regions 1(B), 7, 8, 9, 11 and 15
- Minimum daily capacity: 3,000 kg
- Applicants eligible for up to \$15 million in funding (Cap-X or O&M)
- Note: this is a fictional example for demonstration purposes only!



Source: CARB 2017
AB 8 Annual Evaluation



Applicant Would Provide

- Amount of funding requested, up to a cap,
- Daily nameplate capacity, at or above the minimum,
- The address of each station,
- The daily capacity of each station, which can differ,
- Business case for how a group of stations best serves the market.



Awards

- Each regional competition would have one proposed award, to the highest scoring applicant based on evaluation criteria, and
- The applicant would implement the regional proposal in full.



Issues for Consideration

- Would this approach help avoid the anticipated future capacity shortfall by encouraging applicants to maximize the amount of kilowatts provided per dollar of funding?
- Would it provide more certainty to applicants and enable them to negotiate better prices with vendors and achieve efficiencies in construction, operation, and maintenance?



Other Issues for Consideration

- Any issues with moving away from awarding funding on a per-station basis?
- Does this promote competition and market expansion?
- Is proposing a region feasible?
- How does the value of this mechanism compare with the status quo?



QUESTIONS AND ANSWERS



LUNCH BREAK



Loan Loss Reserve

Phil Cazel



Loan Loss Reserve (LLR)

- Federal banking regulators require an allowance for loan losses (FDIC, Office of the Comptroller of the Currency, and Federal Reserve) which the LLR would cover,
- LLR reduces the risk threshold for emerging markets where obtaining financing may be difficult, and
- LLR provides for specialty programs from State agencies.



California LLR Current Examples

- Charging stations for electric vehicles,
- Small business compliance with federal Americans with Disabilities Act,
- Seismic retrofits on existing buildings and homes, and
- Purchasing cleaner heavy-duty trucks and heavy-duty exhaust retrofits.



Electric Vehicle Charging Station LLR Program

- California Capital Access Program (CalCAP)
 - contributes 20-30% of a loan amount to the lender's loss reserve account to cover defaults
- \$2,000,000 funding established
 - \$2,225 used, so far
 - Covered one \$11,124 loan to install two Level-2 electric vehicle charging stations



Eligibility Requirements

- Energy Commission sets minimum technical requirements
- CalCAP lenders evaluate and underwrite loans



Will LLR Work for Hydrogen Stations?

- 2 - 4 stations could be financed with a \$2 million LLR funded from ARFVTP.
- Definitions required for “Small Business” or “Qualified Business” for eligibility.
- Are station developers (and the Market) ready to take this risk?



Renewable Fuel Sales Reimbursement and Certificate of Guarantee

Andrew Martinez (CARB)



Principles and Limits of Suggestions from 2017 Annual Evaluation

- CARB built upon discussion with industry to develop and assess the potential scope of impact of ideas
- Examples designed to show ranges of possibilities; public input is intended for determination of optimal structures
- Proposed options require separate determination of programmatic, legal, and staff-time requirements
- Methods suggested in the 2017 Annual Evaluation are not exhaustive



Certificate of Guarantee

- How It Works (1/2):
 - Prior to signing a contract with a station developer, the State has determined (through public process) appropriate Certificate Ratio and Maturation Period
 - The State reimburses costs at the end of the Maturation Period
 - Four variables directly impact the amount reimbursed by the State:
 - Certificate Ratio: The maximum portion of the station's capital cost that could be reimbursed through contract with the State (this guarantee may be used to secure loans for the remaining station cost through a private entity or the developer could use their own capital)
 - Station Utilization: The amount of throughput at a station compared to its rated capacity, evaluated over the entire Maturation Period
 - Reimbursement Rate: A pro-rated value tied to the Station's Utilization that determines the total value of the Certificate at the end of the Maturation Period (up to the Certificate Ratio)
 - Maturation Period: The date at which the Certificate's value is evaluated (Given the current state of fueling network development, shorter maturation periods represent sooner access to State funds for station developers but also greater risk taken on by the State program)



Certificate of Guarantee

- How It Works (2/2):
 - The State manages the total funds in the program, setting aside the total funds necessary to be able to pay all future amounts due at the end of the contracts' Maturation Period
 - The State could potentially monitor utilization at all contracted stations each year to continually update the amount of funds that must be held for all existing contracts (and the amount that can be freed-up)
 - Reimbursement Rate for each station contract would be determined by a standard formula such that higher Station Utilization results in lower Reimbursement Rate
 - Any amount not ultimately claimed by any contracted station (because the Station's Utilization is high, which reduces the Reimbursement Rate) can be re-invested into additional contracts for other stations



California Energy Commission

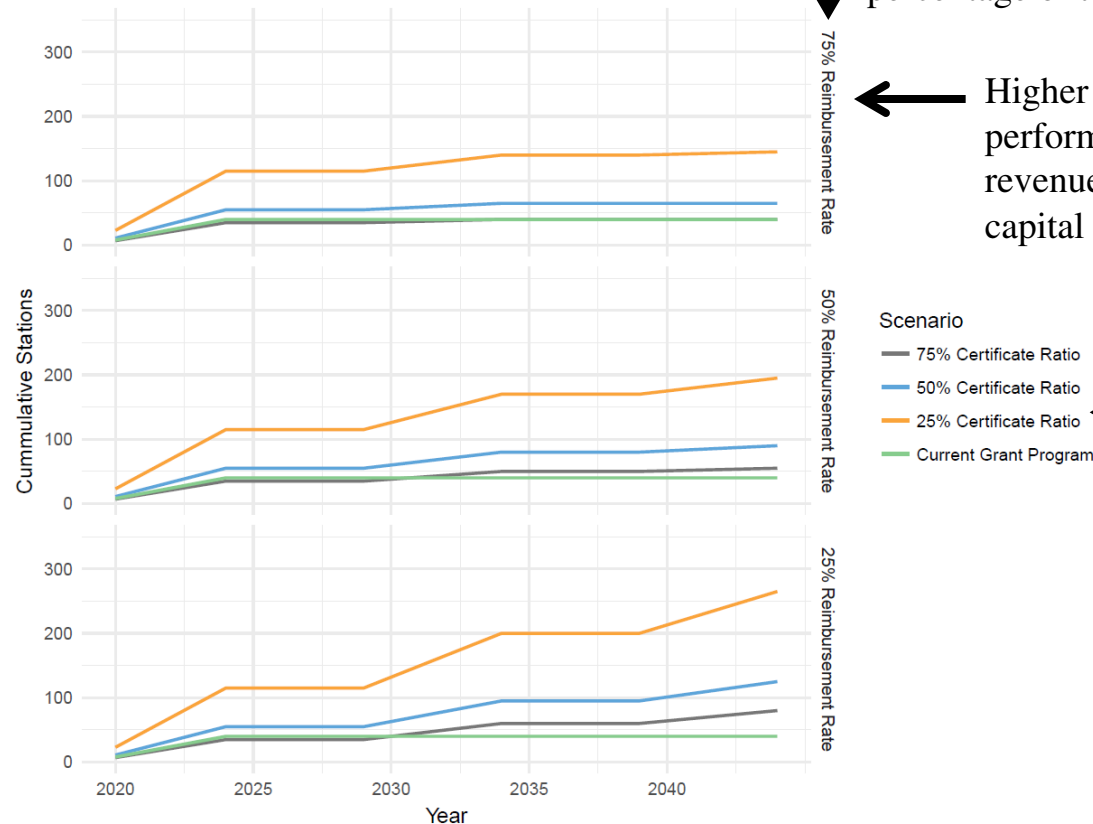
Certificate of Guarantee

- Exploration of Potential Impacts:
 - For a 10-Year Maturation Period

Assume that at the end of the Maturation Period, stations ultimately need to be reimbursed for this percentage of the Certificate Ratio



Higher Reimbursement Rates indicate a lower-performing station that therefore has limited revenue and requires greater assistance to cover capital investment



Assume stations contracted with expectation that State needs to keep funds for this percent of station capital cost. Lower Certificate Ratios allow investment in greater numbers of stations.



California Energy Commission

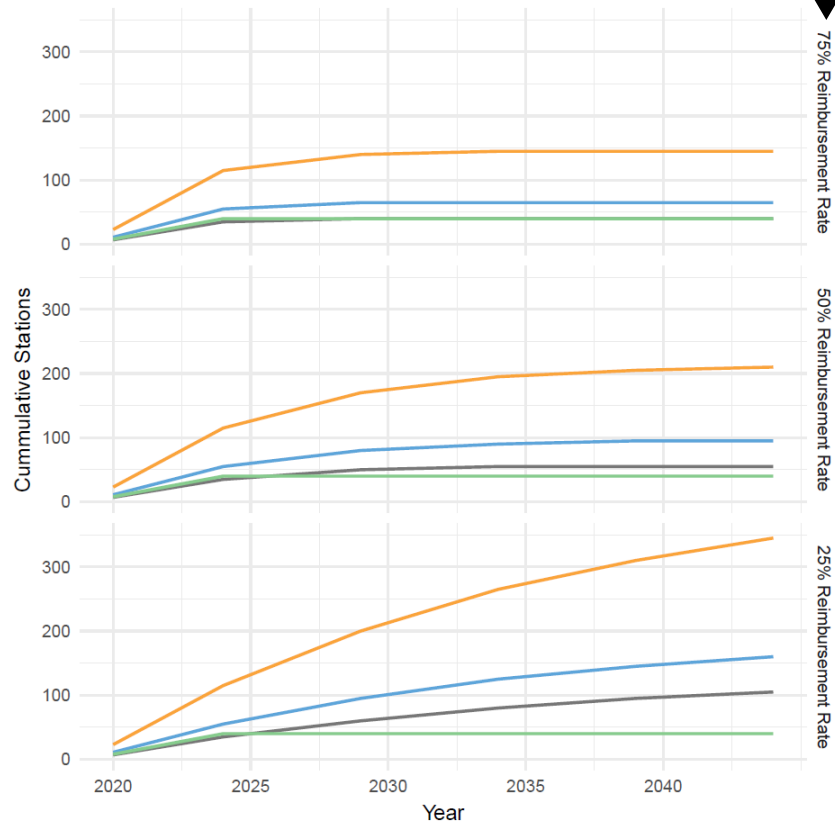
Certificate of Guarantee

- Exploration of Potential Impacts:
 - For a 5-Year Maturation Period

Assume that at the end of the Maturation Period, stations ultimately need to be reimbursed for this percentage of the Certificate Ratio



Higher Reimbursement Rates indicate a lower-performing station that therefore has limited revenue and requires greater assistance to cover capital investment



Scenario

- 75% Certificate Ratio
- 50% Certificate Ratio
- 25% Certificate Ratio
- Current Grant Program

Assume stations contracted with expectation that State needs to keep funds for this percent of station capital cost. Lower Certificate Ratios allow investment in greater numbers of stations.

A shorter Maturation Period gives less time for a station's market to develop. The State likely has to pay at higher Reimbursement Rates in this case and may need to pursue lower Certificate Ratios than in a 10-year Maturation Period case.



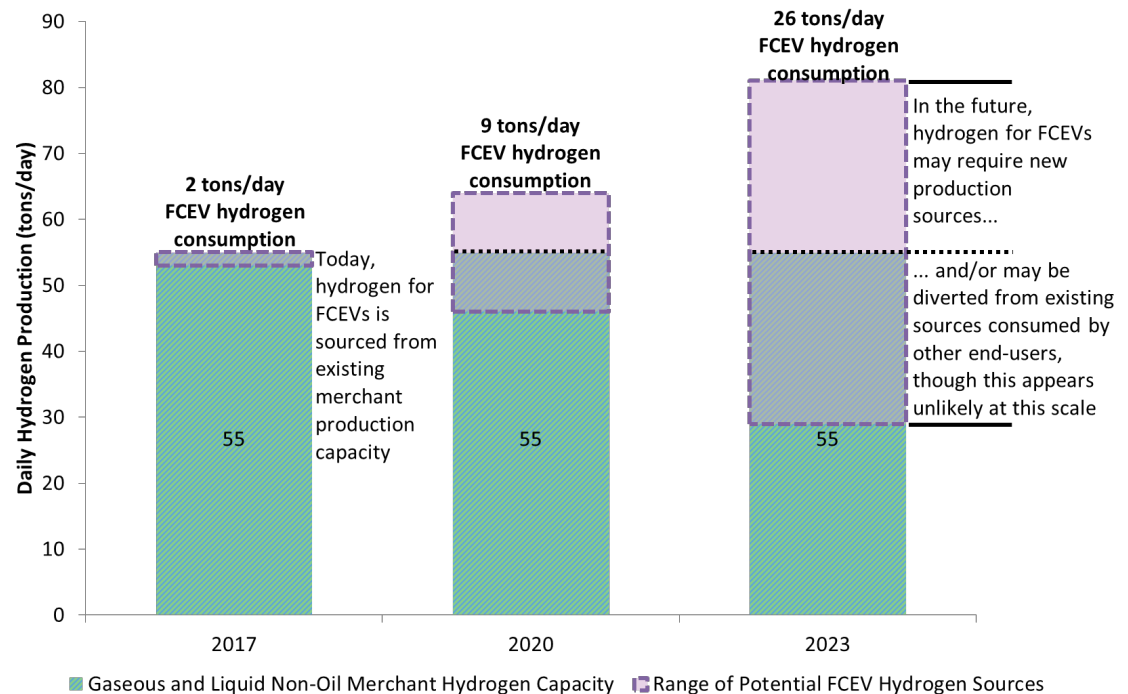
Certificate of Guarantee

- Implications of Implementation:
 - Stations that perform well (due to match in choice of location and station design, station operations and management principles, or other reasons) will receive less State funds than stations that don't perform as well
 - State and developer need to work closely together and share potentially confidential business information regarding outlook for station performance in order to come to agreement on appropriate Certificate Ratio
 - Smaller developers without easy access to capital may find this structure untenable
 - There may be a risk that the developer under-estimates the necessary Certificate Ratio and the station may require additional capital



In-State Hydrogen Production Gap

- Renewable and conventional hydrogen production capacity in California are rapidly becoming a priority, similar to fueling coverage and capacity. It is unclear where the necessary volumes will be sourced, especially for renewable hydrogen.



*Production capacity data provided by Pacific Northwest National Laboratory



Renewable Fuel Reimbursement

- How It Works:
 - State provides reimbursement for the amount of renewably-sourced hydrogen that is sold at each station (the payment period can be standardized in contract terms)
 - The amount of renewable hydrogen reimbursement will be a set amount (\$/kg) for every kg sold above the requirements of SB1505 (which is 33%)
 - Verification of the amount and renewable content of hydrogen sold at stations would leverage proposed tracking in CARB's Low Carbon Fuel Standard program
 - Limits on the total amount paid to any station or developer may need to be implemented



Renewable Fuel Reimbursement

- Exploration of Potential Impacts:

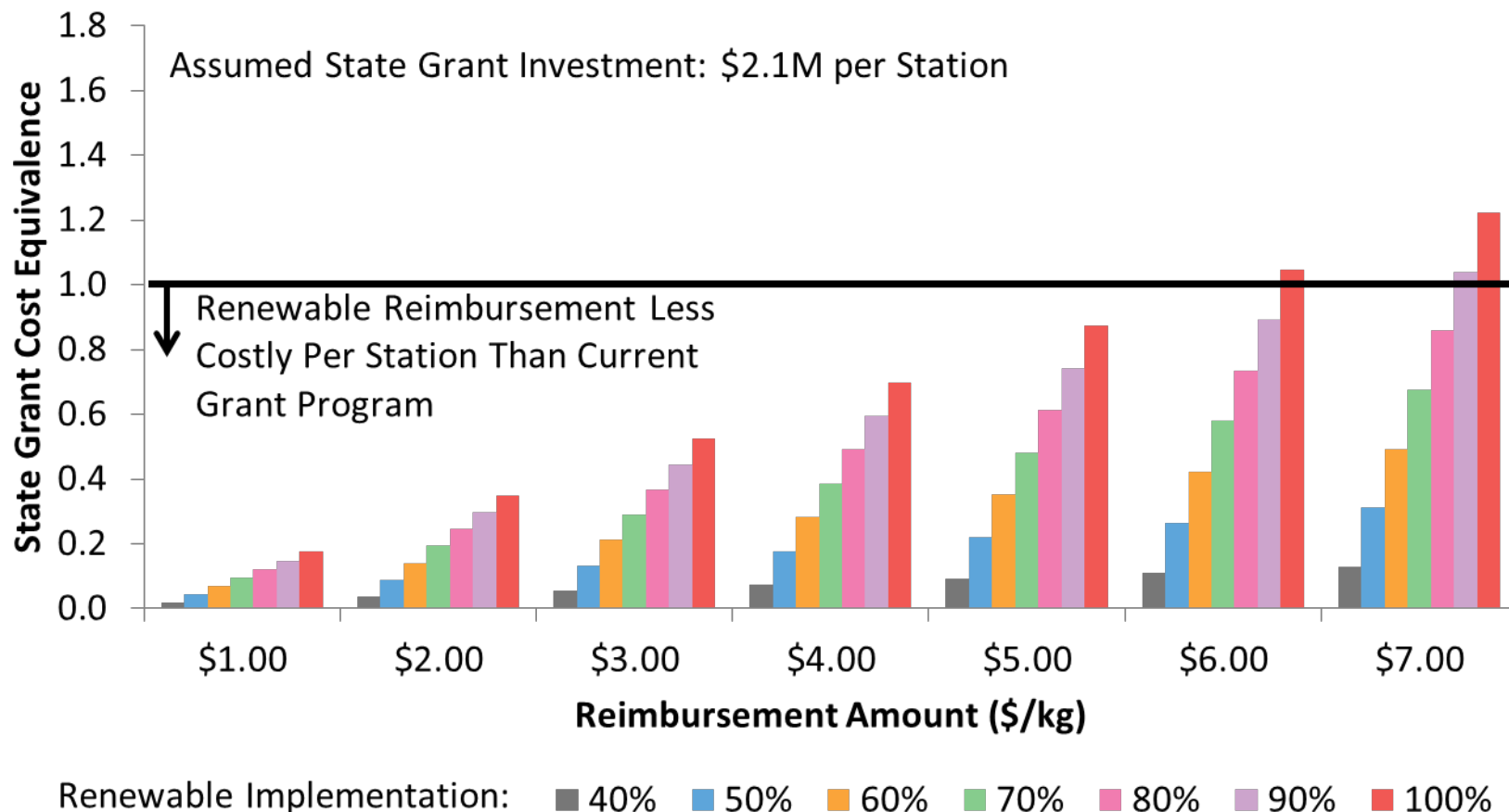
Scenario Evaluation Assumptions:

- All stations 300 kg/day
- All stations assumed to have 100% utilization
- Stations receive renewable hydrogen reimbursement for a total of 5 years
- The following figures show the ratio of the cost of a renewable hydrogen reimbursement program to the current grant program with the following variables explored:
 - Capital grant program provides \$1.6M vs \$2.1M per station
 - Stations are 40%-100% renewable in total (so 7%-67% above SB1505)
 - Stations receive \$1/kg-\$7/kg for eligible renewable hydrogen



Renewable Fuel Reimbursement

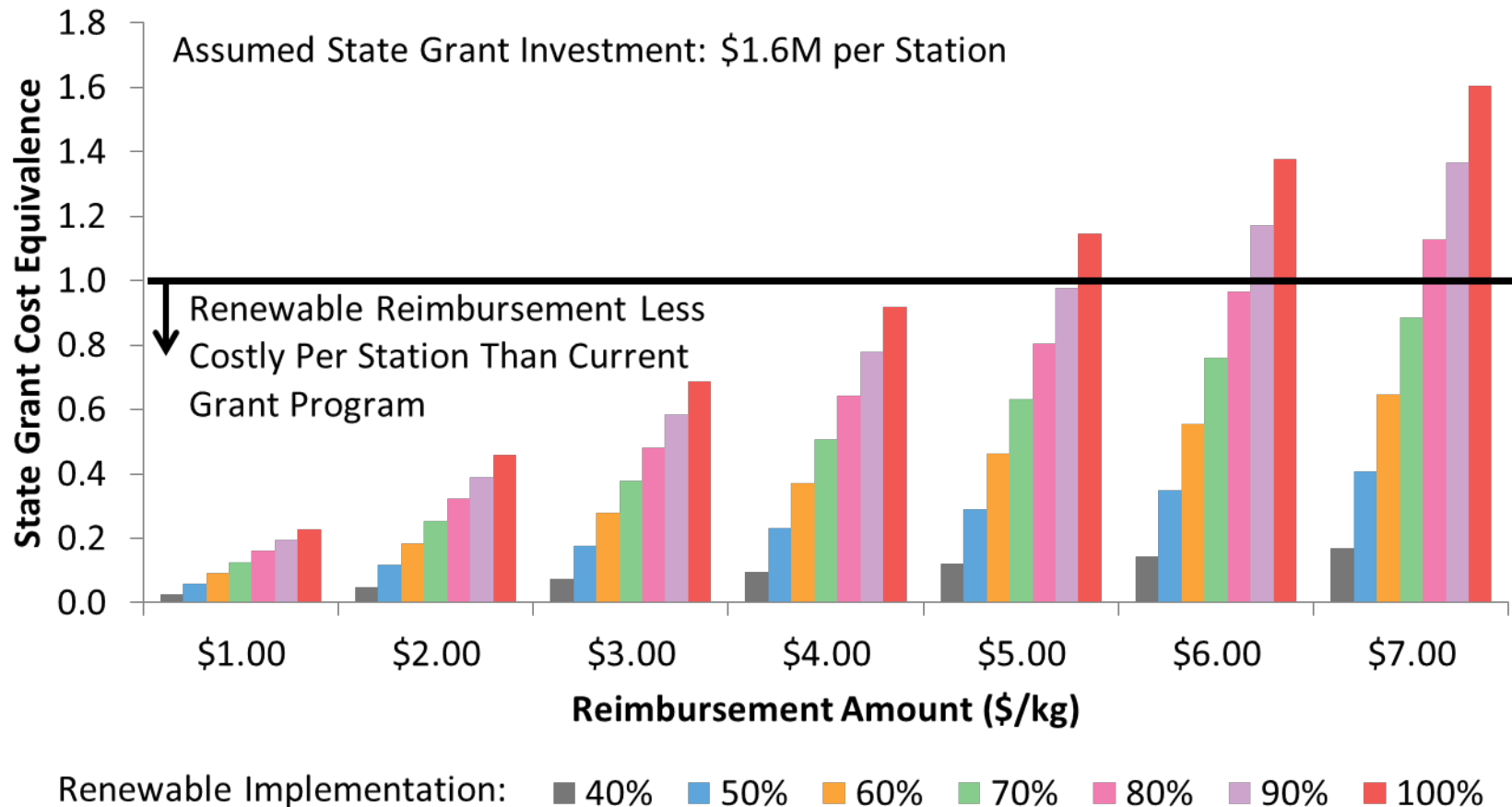
- Exploration of Potential Impacts:





Renewable Fuel Reimbursement

- Exploration of Potential Impacts:

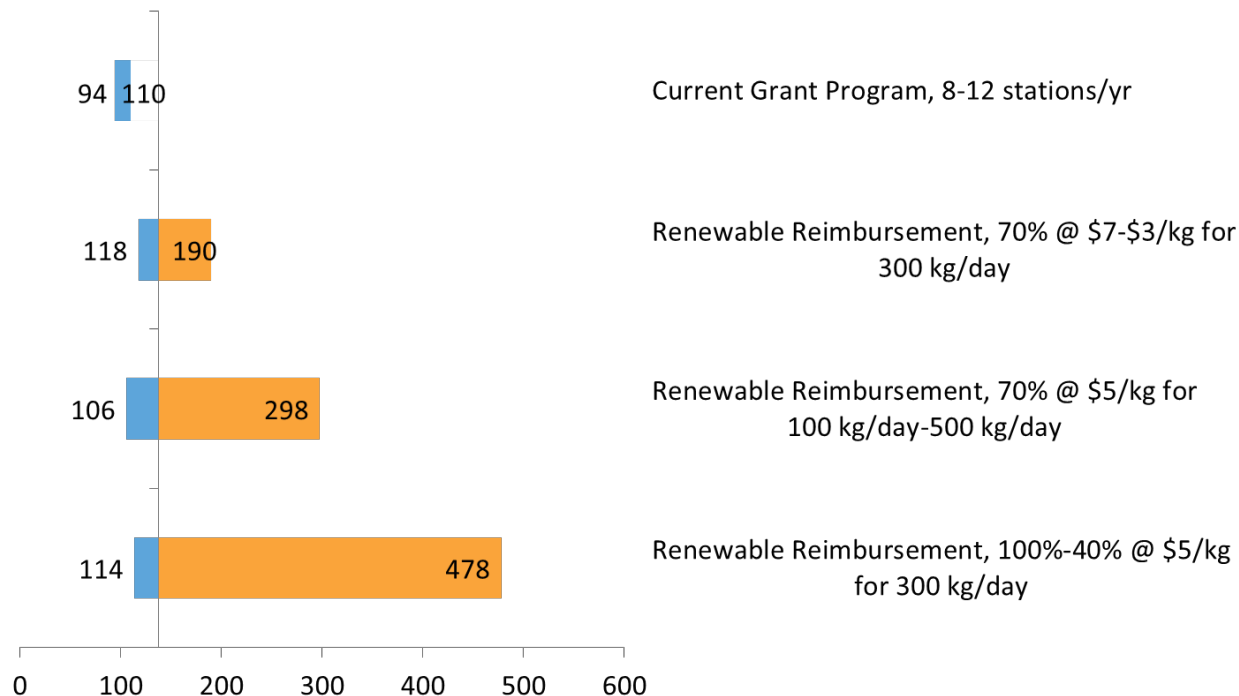




Renewable Fuel Reimbursement

- Exploration of Potential Impacts:
 - Sensitivity analysis for total stations paid for by funds 2020-2023

Baseline Case: Renewable Reimbursement, 70% Renewable @ \$5/kg for 300 kg/day (138 Stations by 2023)





Renewable Fuel Reimbursement

- Implications of Implementation:
 - Greater renewable hydrogen sales could be incentivized, increasing the environmental benefit of the AB 8 program
 - The State takes on the burden of determining the appropriate per-kg incentive level to maximize the progress towards the goals of AB 8 and associated State interests
 - There may not be a guarantee that hydrogen fuel savings are passed on to the consumer
 - Verification of hydrogen throughput to properly compensate station operators could be additional burden to State and developer staff
 - Could be implemented as a first-come, first-served program
 - Smaller developers without easy access to capital may find this structure untenable



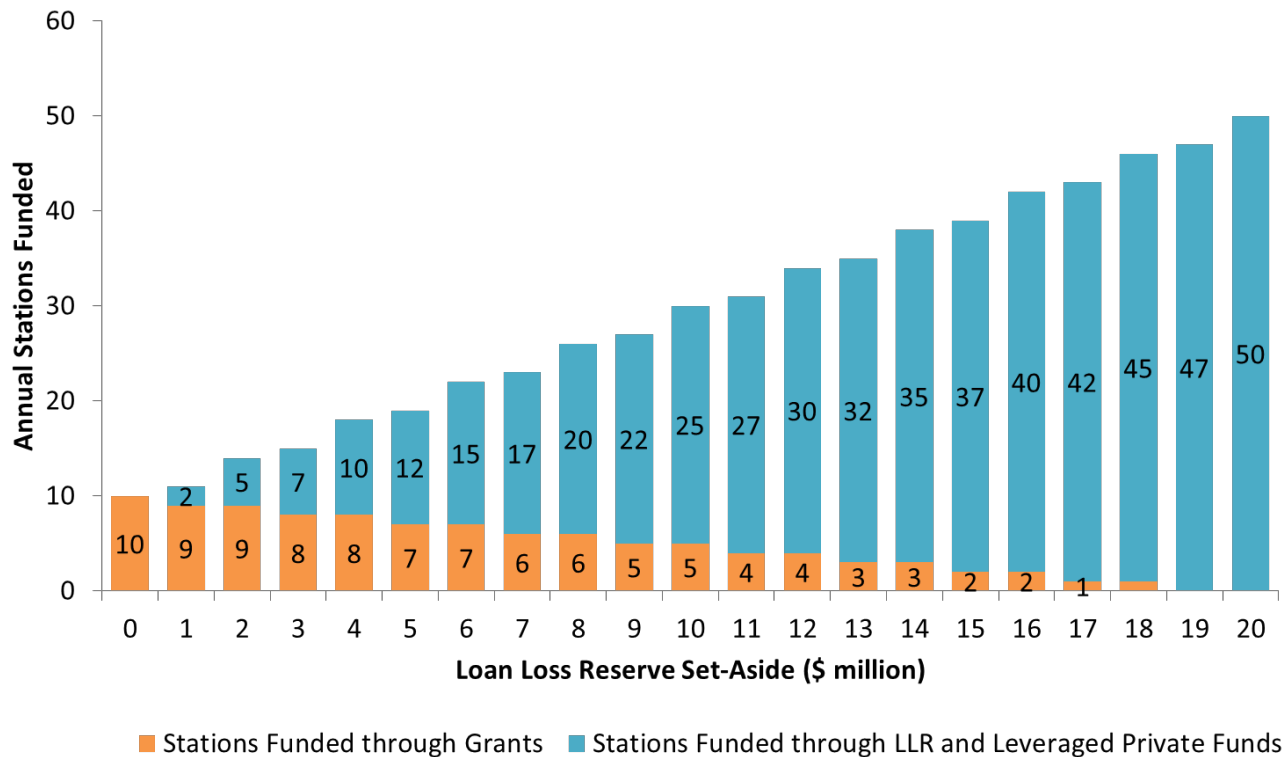
A Note on “Hybrid” Methods

- The 2017 Annual Evaluation noted that the hydrogen fueling and FCEV industries have recently transitioned into the early commercial market phase
- This phase requires rapid growth in order to ensure the continued effectiveness of the past success in establishing California’s hydrogen fueling network
- However, as noted in the Annual Evaluation, the market phase is not uniform across the state. There remain large portions of the state where a hydrogen fueling station would initiate a local market or still be part of the early market establishment. In these cases, capital-intensive funding may still be appropriate
- CARB explored the possibility of regionally-specific “hybrid” funding
 - In fueling markets with little or no established stations, a capital-intensive grant may be appropriate to incentivize market competition and support stations with funding mechanisms commensurate to their business environment
 - In fueling markets with a high degree of existing coverage or capacity, an alternative funding mechanism may be used because the near-term, capital-intensive, business prospects are more favorable and a long-term, risk mitigation strategy is more important



A Note on “Hybrid” Methods

- Taking the example of the Loan Loss Reserve concept with an assumed 20% leverage rate and average State grant of \$2M per station:





For More information:

https://www.arb.ca.gov/msprog/zevprog/ab8/ab8_report_2017.pdf

For questions or comments, contact:

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Grant Amounts

Jean Baronas



Maximum Cap-X Funding Awards

Cap-X on sliding scale to incentivize stations becoming operational quickly: GFO-15-605

- Station capacity: 180-299 kg/day
 - \$2,125,000: 20 months following Energy Commission Business Meeting
 - \$1,700,000, 26 months following Business Meeting
- Station capacity: 300+ kg/day
 - \$2,337,500: 20 months following Energy Commission Business Meeting
 - \$1,700,000, 26 months after Business Meeting



Maximum Operation and Maintenance (O&M) Awards

GFO-15-605

- Up to \$300,000 per station, once operational



Additional Information

**Hydrogen Refueling Infrastructure Alternative
Funding Mechanisms, Updates, and Alternative
Fuels Email listserv**

<http://energy.ca.gov/altfuels/2017-HYD-02/>



Wrap Up

Jean Baronas



Public Discussion

Esther Odufuwa



Contact Information

Please send comments by
December 22, 2017 at 5 P.M. to:

California Energy Commission

Docket Office, MS-4

Re: Docket No. 17-HYD-02

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